399-2-5 (C5708)
Log Data Report

Borehole Information:

Borehole:	399-2-5 (C5708)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	33.25	GWL Date:	10/01/07
North (m)	East (m)	Drill Date	TOC Elevation	Total Depth (ft)	Type
not available	not available	09/28/07	not available	129	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Carbon Steel	0.75	11 3/4	10 3/4	1/2	0.75	129

Borehole Notes:

The logging engineer measured the casing and stickup using a steel tape. Measurements were rounded to the nearest 1/16 in.

Logging Equipment Information:

Logging System:	Gamma 4L		Type:	SGLS (60%) SN: 47TP32211A
Effective Calibration Date:	07/09/07	Calibration Reference:	HGLP-CC-020	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4H		Type:	NMLS SN: H310700352
Effective Calibration Date:	11/22/06	Calibration Reference:	HGLP-CC-020	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	3	4 Repeat			
Date	10/01/07	10/01/07			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	129.0	0.0			
Finish Depth (ft)	0.5	13.0			
Count Time (sec)	100	100			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
ft/min	N/A[2]	N/A			
Pre-Verification	DL041CAB	DL041CAB			
Start File	DL041000	DL041259			
Finish File	DL041257	DL041285			
Post-Verification	DL041CAA	DL041CAA			
Depth Return Error (in.)	0	0			
Comments	No fine gain adjustment	No fine gain adjustment			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2 Repeat			
Date	09/28/07	09/28/07			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	0.0	20.0			
Finish Depth (ft)	32.0	23.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
ft/min	N/A	N/A			
Pre-Verification	DH722CAB	DH722CAB			
Start File	DH722000	DH722129			
Finish File	DH722128	DH722141			
Post-Verification	DH722CAA	DH722CAA			
Depth Return Error (in.)	N/A	+ 0.5			
Comments	No fine gain adjustment	No fine gain adjustment			

Logging Operation Notes:

Logging was conducted with a centralizer on the sondes. Logging data acquisition is referenced to ground level. Repeat data were acquired in this borehole to evaluate each system's performance.

Analysis Notes:

Analyst:	Henwood	Date:	10/16/07	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre-run and post-run verifications for the SGLS (G4L) were acquired in the Amersham verifier, serial number 115 which is enhanced in the naturally occurring radionuclides K-40, U-238, and Th-232 (KUT). The verification criteria were met.

A casing correction for 1/2-in.-thick casing was applied to the SGLS log data.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL worksheet template identified as G4LJuly07.xls using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. No correction for dead time was necessary. A correction for water was applied to data acquired below 33 ft in depth.

The NMLS data are presented as counts per second. A calibration for casing inside diameters greater than 8-in. is not available.

Results and Interpretations:

A plot of manmade radionuclides is included for Cs-137 and processed uranium (U-235 and U-238). The plot indicates all detections based on the routine processing software. All of the detections were at or near the respective MDLs. Inspection of each spectrum where a detection was indicated revealed no full energy peaks. Therefore, the detections are considered to be statistical fluctuations and are not considered valid. No other manmade radionuclides were indicated.

There is a strong indication of radon in the groundwater. Comparison of the 1764 keV and 609 keV Bi-214 gamma rays show differing concentrations after corrections for water and casing. The casing and water correction factors decrease with increasing energy. Gamma rays originating inside the casing are not attenuated by the steel casing, and the net effect of applying the correction factors is to amplify results from

low-energy gamma rays. The fact that the 609 keV gamma ray results in a higher apparent concentration than the 1764 keV gamma line suggests that radon is present in the groundwater. Typical formation concentrations of naturally occurring U-238 are between approximately 0.5 and 1.5 pCi/g. The concentrations above the groundwater level are consistent with these values for the assays of both the 609 and 1764 keV peaks. Note that enhanced radon is not related to the existence of manmade uranium.

The neutron moisture results are reported in counts per second because no valid calibration is available for borehole inside diameters greater than 8 inches. It is not known to what degree this measurement reflects formation moisture.

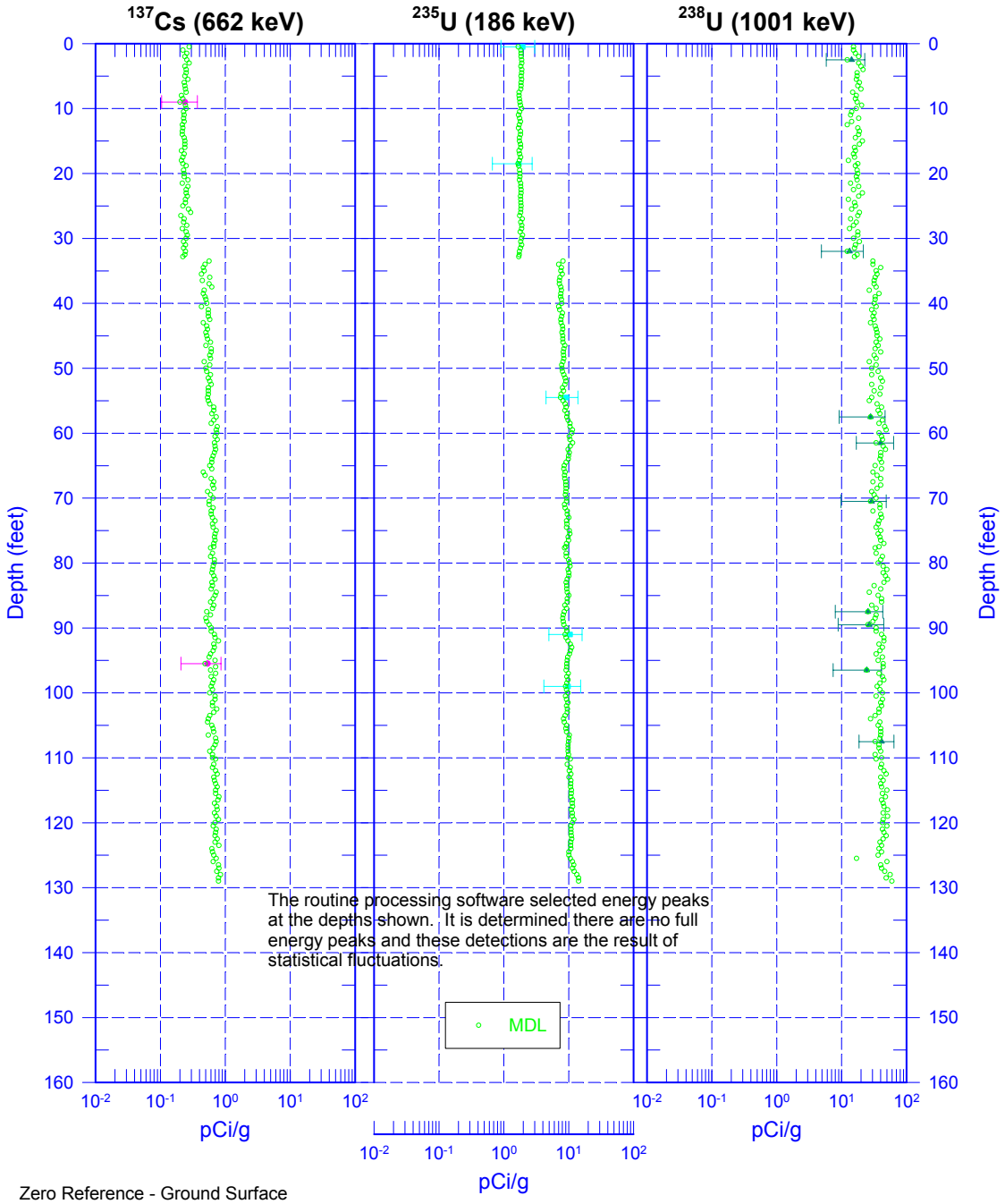
The repeat sections generally indicate good agreement of the naturally occurring KUT and moisture.

List of Log Plots:

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Moisture
Total Gamma & Dead Time
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

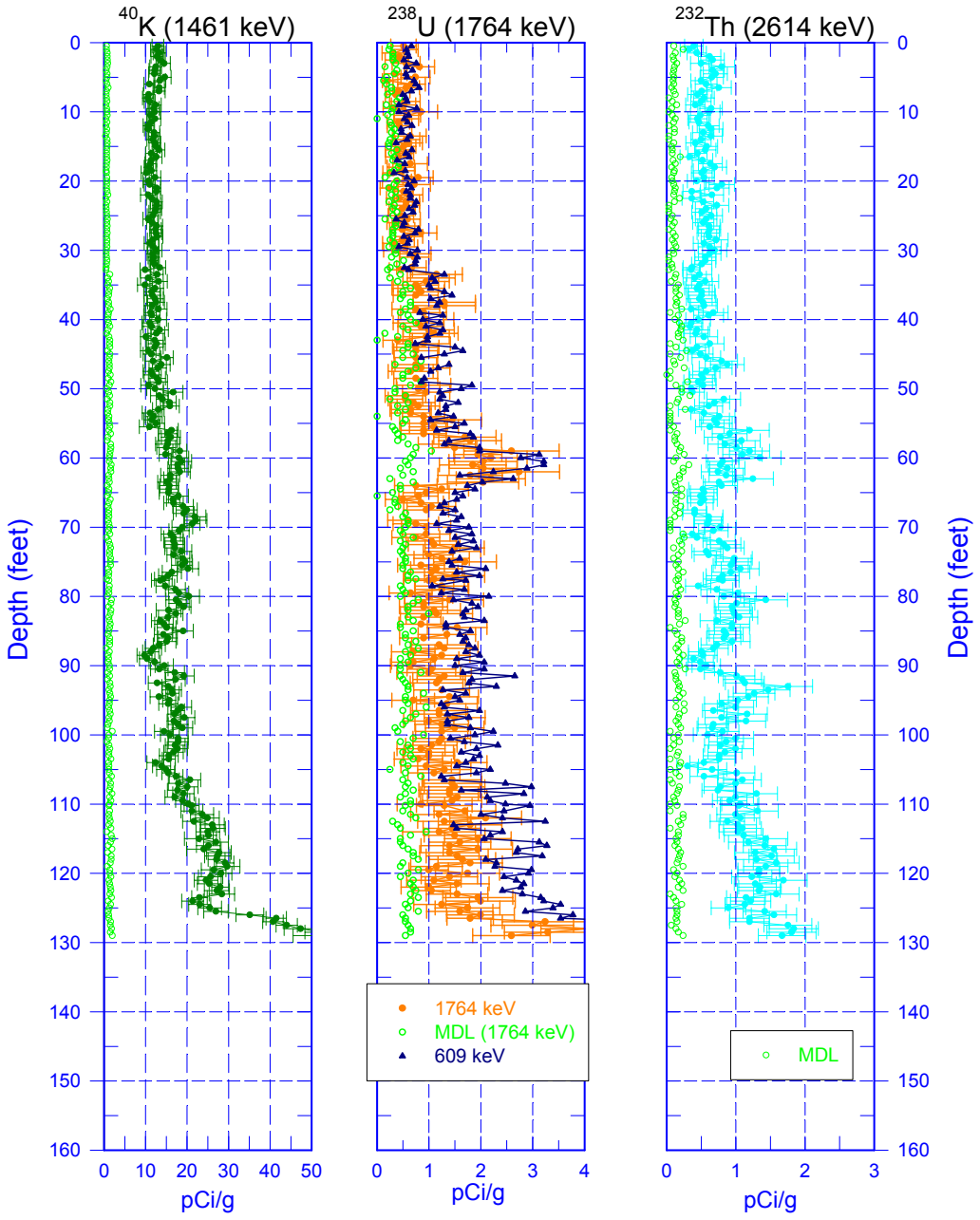
[1] GWL – groundwater level

399-2-5 (C5708)
Manmade Radionuclides

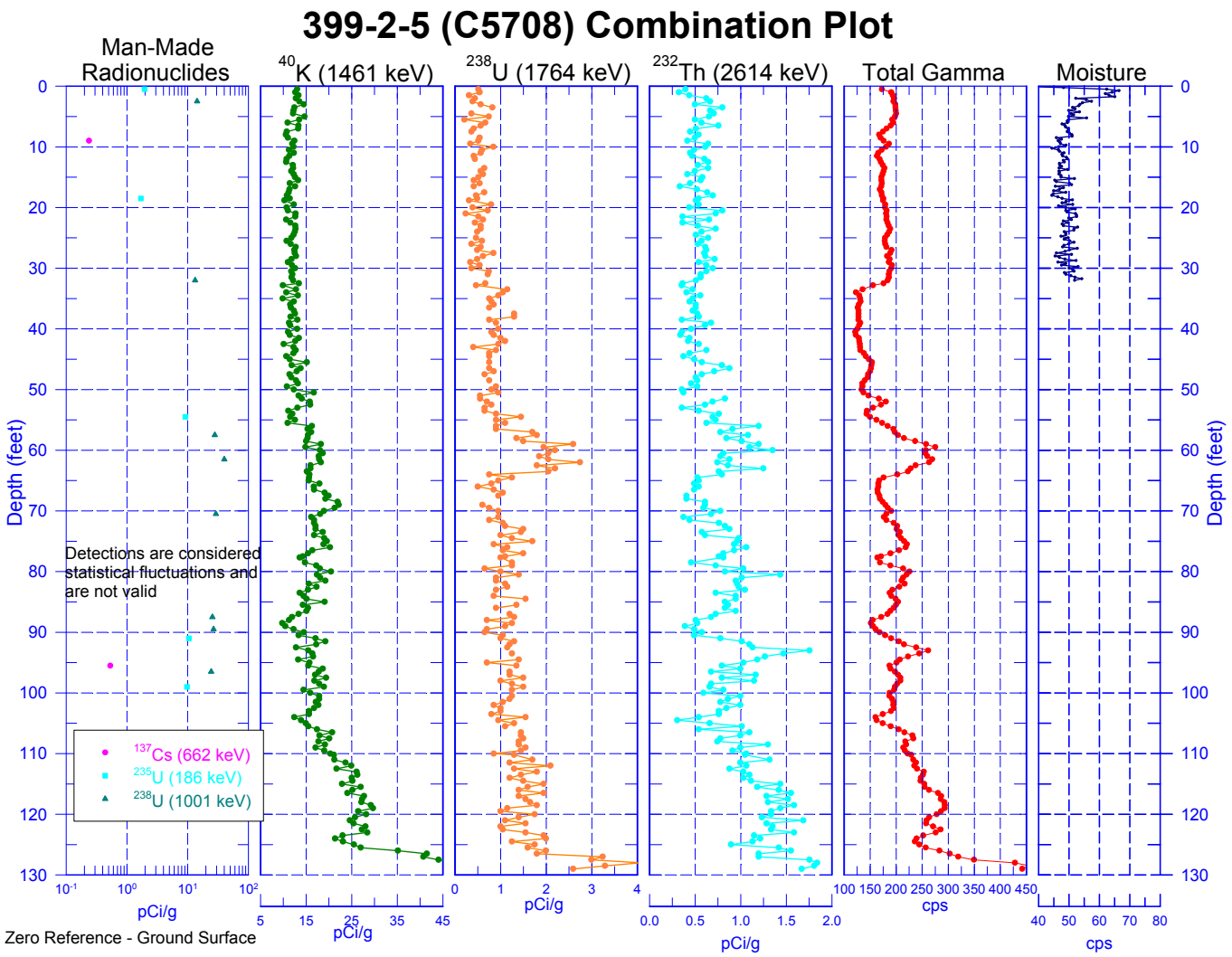


Zero Reference - Ground Surface

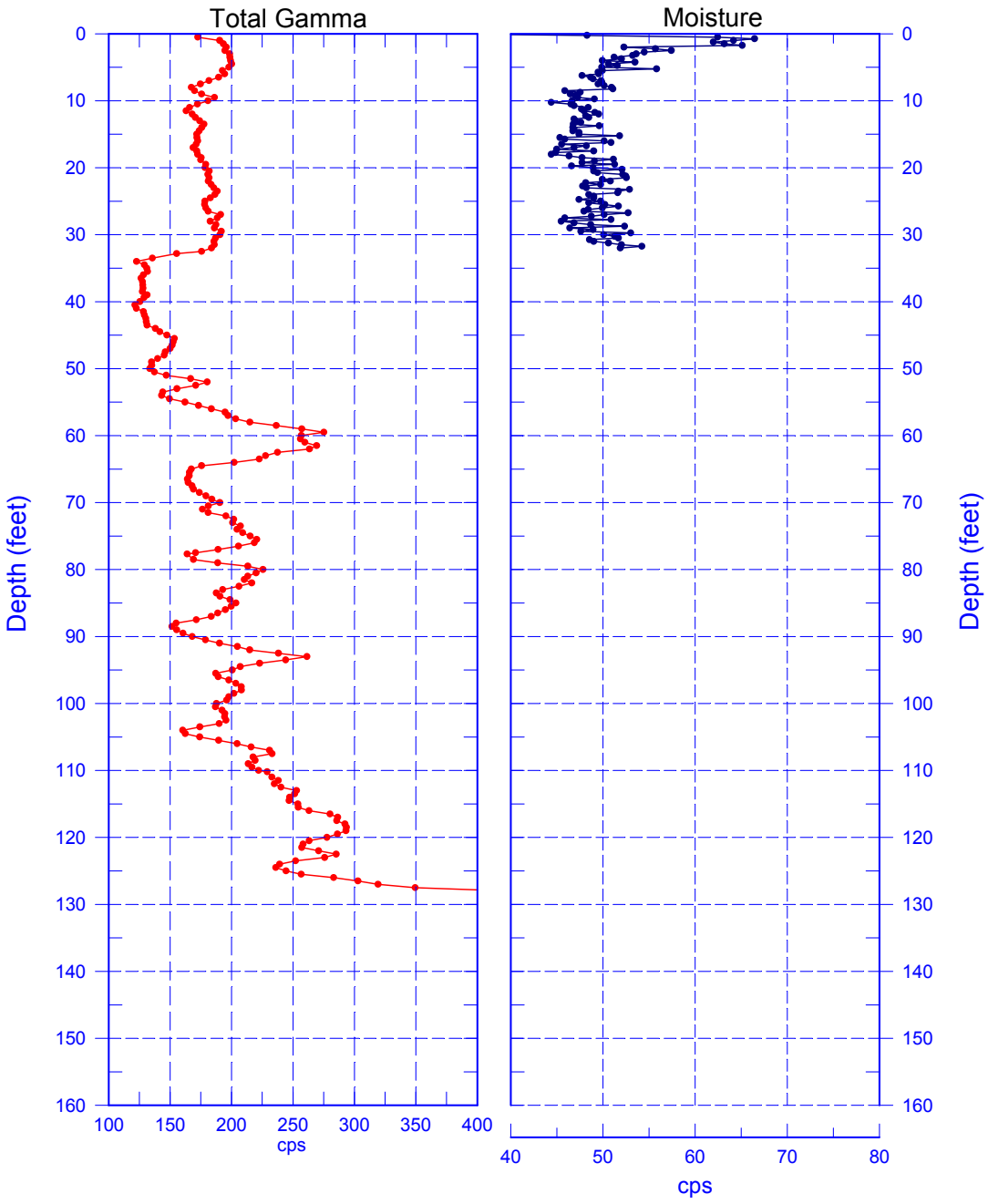
399-2-5 (C5708)
Natural Gamma Logs



Zero Reference - Ground Surface

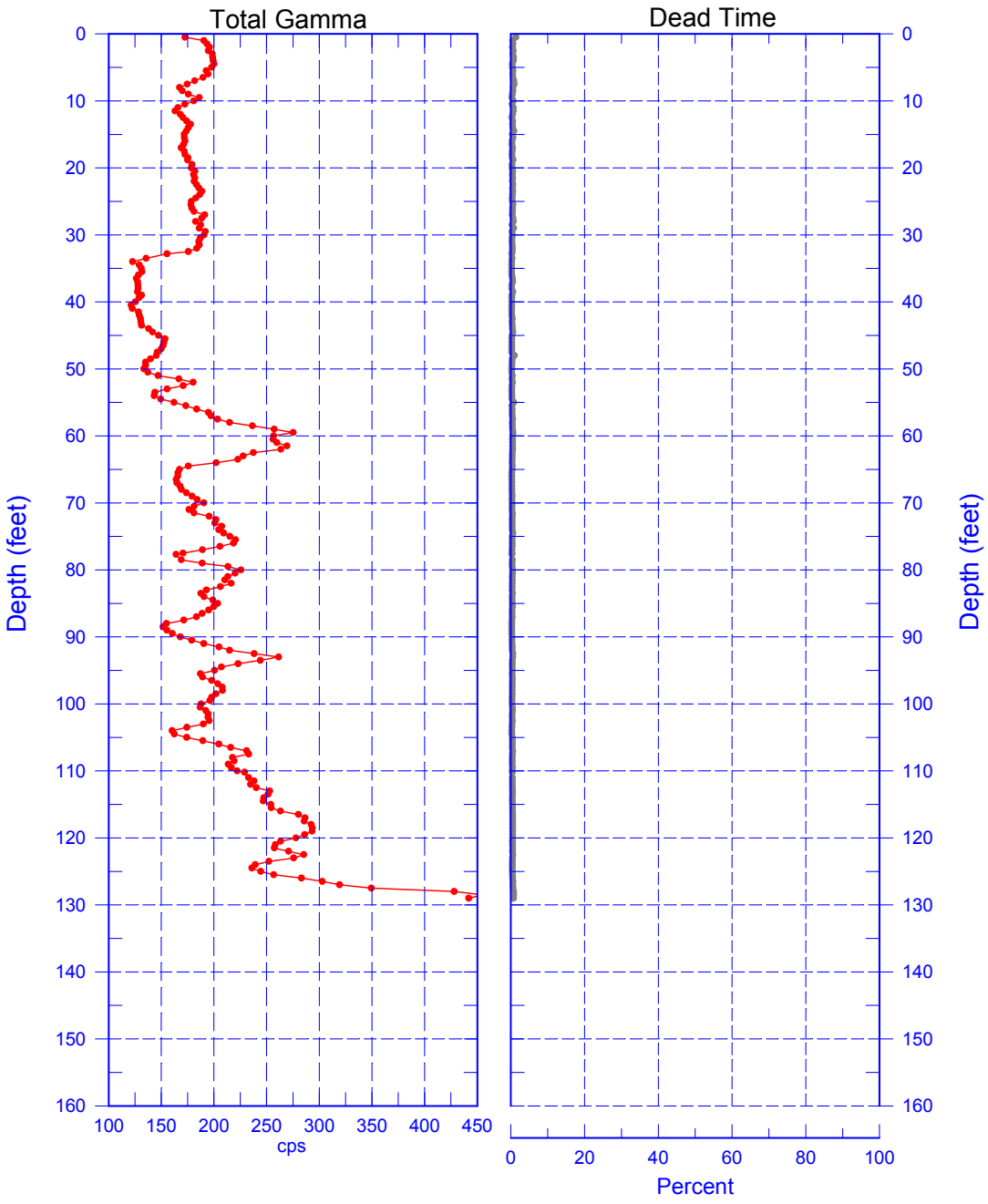

399-2-5 (C5708) Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (1764 keV)
232Th (2614 keV)
Total Gamma
Moisture
Depth (feet)
Detections are considered statistical fluctuations and are not valid
137Cs (662 keV)
235U (186 keV)
238U (1001 keV)
pCi/g
cps
Zero Reference - Ground Surface

399-2-5 (C5708)
Total Gamma & Moisture



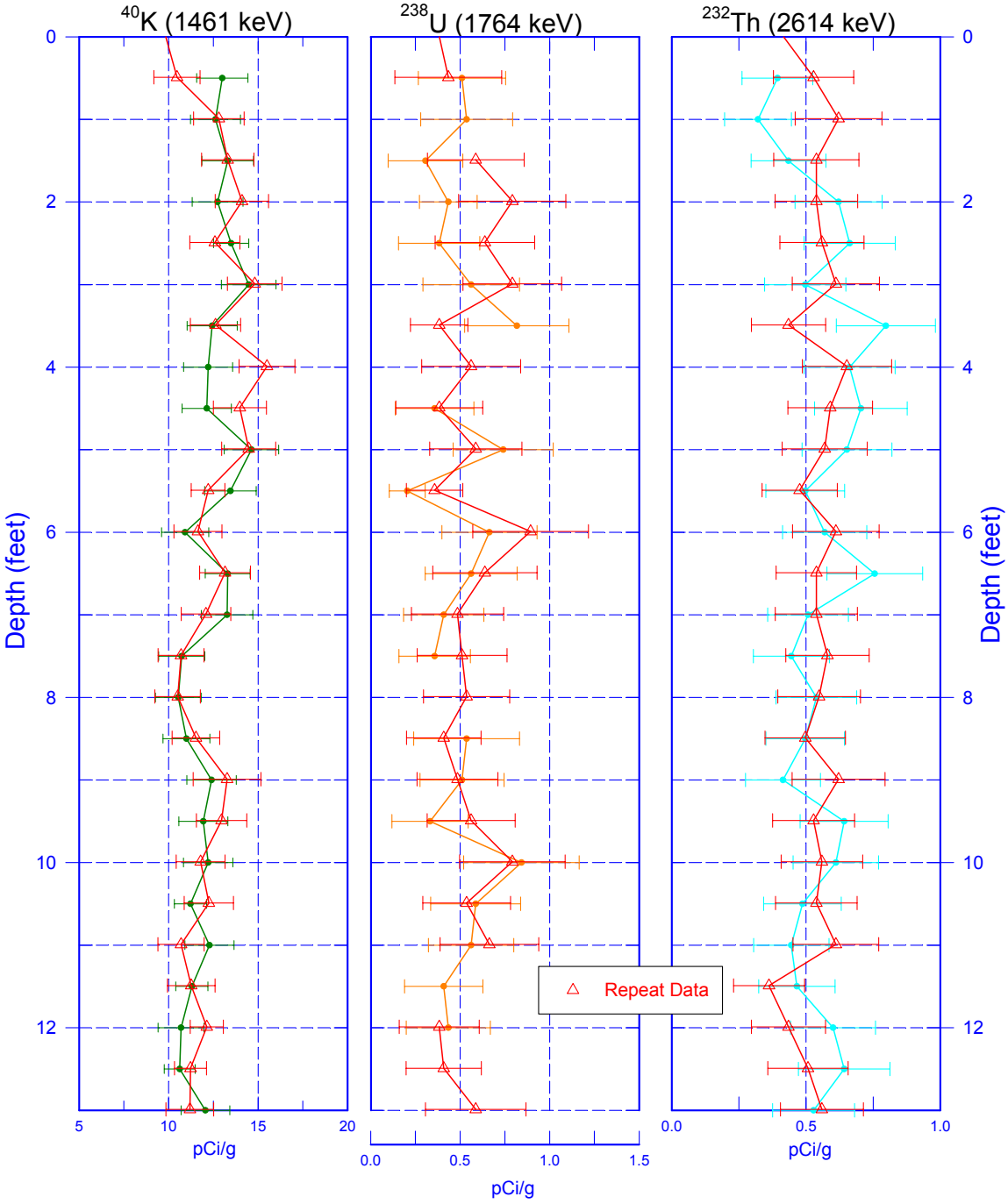
Reference - Ground Surface

399-2-5 (C5708)
Total Gamma & Dead Time

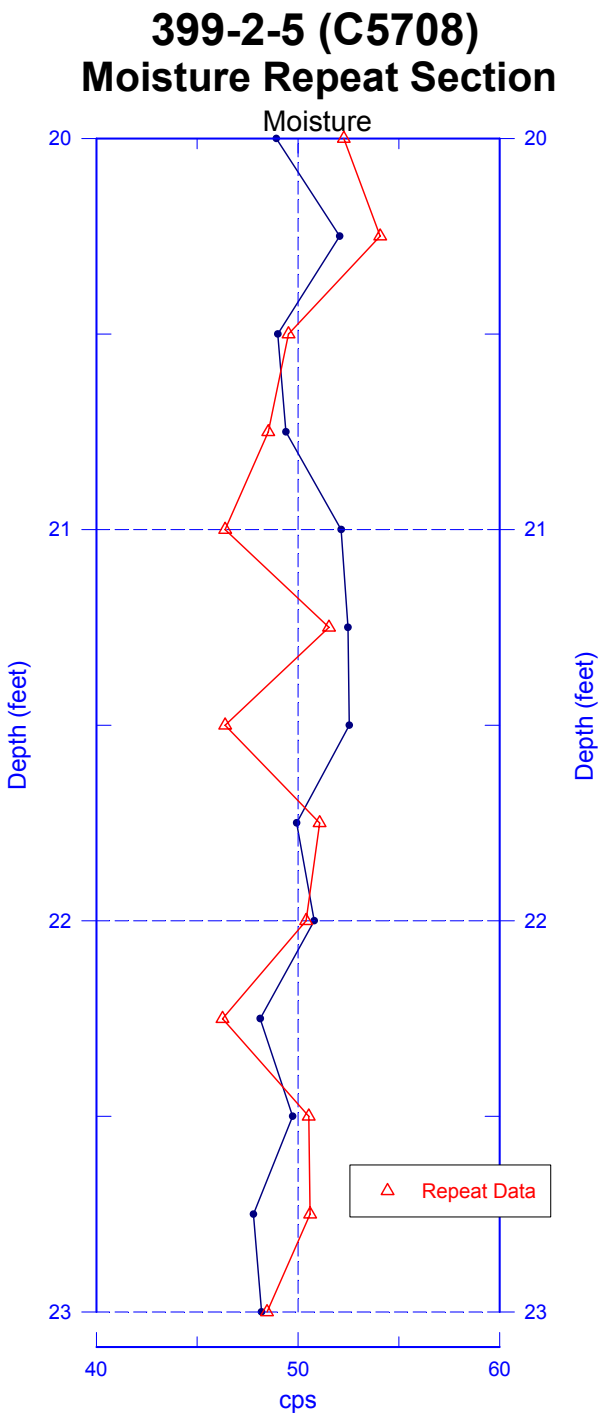


Reference - Ground Surface

399-2-5 (C5708)
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface



Reference - Ground Surface